Compression Neuropathy of the Ulnar Nerve

A Common Condition Occurring at Bed Rest

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• **Compression neuropathy of the ulnar nerve at bed rest appears to be quite common. The symptoms are dysesthesia, weakness and later atrophy in the area of distribution of the nerve. Special attention is required for prevention or for early discovery of the condition in time for treatment to bring about prompt recovery. Physical therapy with electrical stimulation may be useful in the more severe cases. When the condition is progressive or recalcitrant, anterior transplantation of the nerve may be necessary.**

THE SYNDROME of ulnar nerve palsy occurring at bed rest has long been recognized. Sir William Gowers[3] noted in 1886 that many patients sleeping with the elbow flexed complained of tingling and loss of sensation in the region supplied by the ulnar nerve. He observed also that if this condition was superimposed on profound ill health, intense localized neuritis could result. Gowers cited a case of ulnar nerve palsy occurring in a woman recovering from a long prostrating labor. Since that time bed-rest ulnar palsy has been mentioned in many of the standard text books of medicine, but given little further regard. When we directed our attention to this condition it became apparent that it was a common syndrome occurring in many patients lying in hospitals. In the majority of cases the palsy was mild and improved without any particular treatment. The following cases, which were among the more severe, illustrate this syndrome.

REPORT OF CASES

CASE 1. A man 57 years of age fractured his pelvis in a fall on November 23, 1953. Several days later numbness of the ulnar side of both hands was noted. Weakness followed in a few days, and later atrophy of the interosseous muscles. Electrical stimulation was given for two months without benefit. On examination two and one-half years later there was moderate atrophy of the hypothenar eminence and interosseous muscles of both hands, with severe weakness of adduction and abduction of the fingers, weakness of the deep flexors of the ring fingers and little fingers and sensory loss in the area of distribution of the ulnar nerve on the dorsum and palm of both hands. The ulnar grooves were shallow. The nerve was slightly tender and questionably enlarged, but did not subluxate. An electromyogram was reported as showing bilateral abnormalities consistent with neuropathic changes affecting the ulnar nerve at the elbow. No changes were found above the elbows or in the lower extremities.

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Examination on March 11, 1960, showed slight progression of the weakness.

Comment: At first it was thought that the patient might have had injuries of the ulnar nerves at the time of the pelvic fracture, but he denied any symptoms referable to the ulnar nerve until several days after the accident. The ulnar nerve palsy apparently progressed during the five weeks of bed rest, and worsened after ambulation.

CASE 2. A 28-year-old painter fell 15 feet from a scaffold, landing on the right side of his chest and head, and was unconscious for three days. The first, second and third ribs on the right side were fractured. Also present were subcutaneous emphysema, pneumothorax and a linear fracture of the right parietotemporal region of the skull. X-ray films of the cervical spine showed no abnormality. Ten days after the injury, numbness of the little and ring fingers developed but the patient did not call his physician's attention to the condition. A month after leaving the hospital the patient noticed wasting of the small muscles of the hand.

Seven months later examination revealed atrophy and weakness of the small muscles of the hand supplied by the left ulnar nerve, and sensory loss outlining the distribution of the nerve. The ulnar groove was adequate but the nerve was slightly enlarged, and a tender nodule 1 cm. in diameter was palpable on the nerve at the ulnar groove. An electromyogram was reported to show extensive denervation activity in the intrinsic hand muscles supplied by the ulnar nerve, without changes in the flexor carpi ulnaris or finger flexors. By 16 months after the period of stay in hospital the atrophy and weakness of the muscles of the hand had fully re-

covered, but there was still a small area of diminished sensation on the radial side of the little finger.

Comment: The ulnar nerve lesion in this case might have been attributed to the fall except that the injuries then were to the right side of the body with no evidence of injury to the region of the ulnar nerve on the left. Also the patient denied any ulnar nerve disturbance until several days after he was admitted to hospital.

CASE 3. A 41-year-old roofer fell six feet from a ladder and received a compression fracture of the first lumbar vertebra. There had been no apparent injury to the elbow region. After nine days of bed rest in hyperextension the patient noticed numbness in the area of distribution of the ulnar nerve in both hands. The condition improved on the left side but progressed on the right, with increasing atrophy of the small muscles of the hand and vague cramping sensations in the elbow and forearm.

Eight months later there was atrophy of the small muscles supplied by the ulnar nerve in the right hand. No weakness of the flexor carpi ulnaris or finger flexors was noted. Diminished sensation was outlined in the ulnar nerve distribution. The ulnar grooves were deep but the nerve was slightly swollen and tender. There were no abnormal neurological findings in the left hand.

Electromyographic abnormality was found in the flexor carpi ulnaris and in the small muscles of the hand supplied by the ulnar nerve. Daily electrical stimulation over a three-month period produced no improvement. On the last examination, some 12 months after the onset of symptoms, it was noted that there was a complete paralysis of the small muscles of the right hand supplied by the ulnar nerve and no change in the previously noted sensory loss. Slight atrophy of the first dorsal interosseous of the left hand, without sensory loss, also was noted. Anterior transplantation of the ulnar nerve was recommended but was refused.

CASE 4. A 44-year-old man was thrown from an automobile in an accident and was unconscious for four hours. He had fractures of the right seventh and eighth ribs, the right scapula, right humerus, left ankle and the transverse processes of the second, third and fourth lumbar vertebrae. There was no injury to the left elbow. He had fractured the left elbow at age 10, with subsequent valgus deformity; but never before had there been symptoms referable to the ulnar nerve. One week after bed rest in hyperextension the patient noted numbness in the ulnar area of the left hand. Five months later he had a gunstock deformity of the left elbow. The ulnar groove was shallow and subluxation of the ulnar nerve on flexion was noted. The nerve was slightly swollen and tender. There was sensory impairment in the area of the ulnar nerve distribution in the hand, with minimal atrophy. The small muscles of the hand were weak. The patient could not be reached for a later examination.

Comment: Consideration must be given to the possibility of the ulnar palsy as a late sequel of the fracture and deformity of the elbow in childhood. However, the patient denied any symptoms referable to the ulnar nerve before his stay in hospital, he recognized the origin of his symptoms and was able to avoid further progression of his condition.

CASE 5. A 28-year-old man received severe injury to the head, with subarachnoid hemorrhage, bilateral abducens palsy and cerebellar contusion, multiple rib fractures, rupture of the spleen and renal contusion in an automobile accident. There were no apparent injuries to the elbow. Upon neurological examination two weeks later, weakness of the small muscles of the right hand and sensory loss in the area of the ulnar nerve distribution were noted, in addition to the injuries of the central nervous system. The ulnar nerve in the right arm was swollen and subluxation occurred on the flexion of the elbow. The ulnar nerve in the left arm was also tender but did not subluxate, and there was no other neurological abnormality on this side. Prompt restriction of pressure by use of soft pads under the elbow stopped the progression of the ulnar palsy and improvement began within a month. It was no longer present six months later.

Comment: The time of the onset of ulnar palsy was not known since the patient was confused and did not spontaneously complain of difficulty. There was no evidence of direct trauma to the elbow. Prompt recognition of the condition and avoidance of compression appeared to prevent progression.

CASE 6. A 38-year-old man had fractures of the pelvis, rupture of the urinary bladder and a week of mental disorientation owing to an automobile collision. There was no evidence of injury to the elbows. He was immobilized in a body cast, and approximately ten days after admission he complained of numbness in the area of the ulnar nerve distribution in both hands. He had supported himself on his elbows when turning in bed. Atrophy of the small muscles of the hands on both sides was noted three weeks later.

On examination seven months after the injury, moderate weakness of the muscles supplied by the ulnar nerve in the right hand was observed, with a claw hand, atrophy of the interosseous muscles and characteristic sensory loss. In the left hand there was decided weakness of the muscles supplied by the ulnar nerve, with atrophy and sensory loss.

Electrical stimulation was advised, but the patient did not return for reexamination.

CASE 7. A 38-year-old woman received a fracture of the right humerus and of the right ankle in an automobile collision June 22, 1959. Both fractures were treated by traction for three days, and then casts were applied. There was no previous history of paresthesia. Numbness of the ulnar side of the left hand began June 29, 1959. Atrophy and weakness of the hand were not definitely noted until January 1960. On examination in March 1960, diminished sensation in the area of distribution of the ulnar nerve in the left hand, with weakness and atrophy of all the muscles supplied by the ulnar nerve, was noted. The ulnar nerve subluxated when the elbow was flexed.

Anterior transplantation of the ulnar nerve was carried out March 25, 1960, and the nerve was of normal appearance except for subluxation on flexion of the elbow. When the patient was examined November 1, 1960, there had been definite improvement of strength. Paresthesia and atrophy were diminished. On May 27, 1961, there was slight atrophy but normal strength in the interosseous muscles. No atrophy was discernible in the hypothenar eminence. Froment's sign* was present. So far as could be determined there was no sensory loss. Power in the finger flexors and flexor carpi ulnaris was normal. The nerve was well anterior to the epicondyle and was not tender.

Comment: The patient recalled that most of the time she lay in bed her left hand rested on her chest with the elbow resting flexed against the mattress. This position brought about subluxation of the nerve and allowed compression between the bone and the mattress.

CASE 8. A 31-year-old man had repair of a diaphragmatic hernia on February 13, 1959, and his right arm was restrained to allow continuous intravenous infusions. After three days he noticed numbness of the right hand, which improved slightly when the arm was released. After he began walking he noted difficulty in using the hand, and atrophy subsequently developed.

On examination six months later pronounced weakness and atrophy of the hand muscles supplied by the ulnar nerve were noted, as well as weakness of the flexor carpi ulnaris and finger flexors of the fourth and fifth fingers, with a flexion deformity. Sensory loss could be outlined in the area of distribution of the ulnar nerve in the hand. The ulnar groove was shallow and the nerve was slightly swollen but subluxation did not occur.

*When opposing the thumb to the first finger to grasp a paper, the distal phalanx is sharply flexed to compensate for weakness of the adductor pollicis muscle. Also called *signe de journal.*

The ulnar groove was examined surgically on August 7, 1959, and the nerve was observed to be slightly thickened in its lowest portion. Saline solution injected into the sheath hesitated at the mid-portion of the ulnar groove. The nerve was transplanted anteriorly beneath the flexor muscles.

By May 17, 1960, the atrophy of the right hand had improved, with normal power present in the interosseous and adductor pollucis muscles. There was distinct improvement in the forearm muscles supplied by the ulnar nerve. Sensory impairment was minimal.

Comment: The patient had observed no change in his ulnar palsy in the six months after it began. Although the findings at the time of operation were minimal, definite improvement resulted from anterior transplantation of the nerve.

CASE 9. A 27-year-old male who received a head injury and fracture of the odontoid process in an automobile accident in October, 1960, was treated by traction upon Crutchfield tongs. Three weeks after admission he noticed dysesthesia in the ulnar nerve distribution of the right hand. Weakness and slight atrophy followed. In March, 1961, there was sensory loss in the distribution of the right ulnar nerve with slight atrophy of the first dorsal interosseous muscle on both sides, but no other weakness.

CASE 10. Four days after operation for repair of a herniated intervertebral disk in the lumbar region a 51-year-old man noticed numbness and slight weakness of the small muscles of the right hand. A protective sponge rubber pad was taped to the right elbow and the patient avoided pressure on the ulnar nerve but the weakness and sensory loss did not improve. Anterior transplantation of the ulnar nerve was carried out some three months later. Slight swelling of the nerve was the only abnormality noted. When seen seven months after the operation the patient said numbness had abated in three months. Examination showed only slight atrophy of the first dorsal interosseous muscle with no weakness of any of the small hand muscles.

Comment: Ulnar nerve palsy did not appear in this case until several days after the spinal operation. Apparently it was caused by pressure against the elbow when the patient turned himself in bed. The ulnar palsy was on the same side as the bedside table, a relationship previously mentioned by Mumenthaler.[6] This is the only case in which we noted such a relationship. However, it was noted that the palsy was more frequent on the uninjured side of the body, suggesting that support of the body on the elbow was a major factor.

DISCUSSION

Many normal persons informed us that reading in bed with the elbows resting against the mattress would produce paresthesias in the hand after variable periods. Lewis, Pickering and Rothschild[5] in 1931, after a series of nerve compression experiments, concluded that these temporary changes were due to local ischemia of the nerve trunk. Denny-Brown and Brenner[2] showed that the cause of persistent difficulty was the result of changes in the nerve fibers and myelin sheath.

The cause of progression of the lesion following removal of compression is not clear. We agree with Conway[1] that the ulnar nerve is ordinarily capable of stretching sufficiently to compensate for motion of the elbow but are of the opinion that when intrinsic damage to the nerve impairs its elasticity flexion and extension may produce repeated trauma and progression of palsy.

The majority of the cases presented were in patients who were confined to bed because of trauma. However, the condition occurs also in patients who are confined to bed for other reasons. It is probable that in many cases symptoms attributed to toxic paralysis of a febrile illness are in fact due to compressive neuropathy of bed rest. It is apt to occur in patients confined in the supine position, or those in whom mobility is impaired by paralysis, coma, or restraining devices. The palsy was noted more often on the side opposite the injury. It is more common in patients with a shallow ulnar groove or who have a history of paresthesia in the hand following elbow compression. We believe it is particularly likely to occur when there is dislocation of the ulnar nerve.[7] When the patient is supine with the elbow flexed and the hand resting on the chest, the position of the arm permits the ulnar nerve to dislocate onto the medial aspect of the elbow, where it is compressed. In some patients the nerve can be sufficiently compressed between the bone of the ulnar groove and the mattress to cause palsy.

The first symptoms—dysesthesia and weakness—may appear a few hours to several days after bed rest. Atrophy may develop later. Pain is unusual. In some of the cases we observed, the forearm muscles were not affected, probably due to anatomical variation of their nerve supply. When the condition is recognized promptly and further nerve compression avoided, spontaneous recovery is usual. Mumenthaler[6] was unable to find a relationship between the type of mattress and the development of the paralysis. Despite padding of the elbow, progression occurred in one of the patients we treated. A small pillow under the posterior aspect of the arm and forearm, suspending the elbow, offers the best chance of relief of compression.

In the more severe cases physical therapy, especially electrical stimulation of the nerve, is administered. Anterior transplantation of the nerve may be beneficial to patients who do not improve or in whom the condition progresses.

In view of the frequency of the condition, special attention should be given to prevention of ulnar nerve compression in patients confined to bed for a long time, especially if they must remain supine or are immobilized. A history of paresthesias while reading in bed, sitting in an arm chair, or driving an automobile should be noted. The elbow should be inspected for any abnormality of the carrying angle, for shallowness of the ulnar groove, for tendency of the ulnar nerve to dislocate when the arm is flexed and for any unusual tenderness of the nerve. When any of these conditions is found the patient should be advised of the position of the nerve, to avoid pressure against this region and to report any dysesthesia promptly. Meals should be served over the bed rather than on a bedside table to avoid supporting weight on an elbow.

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